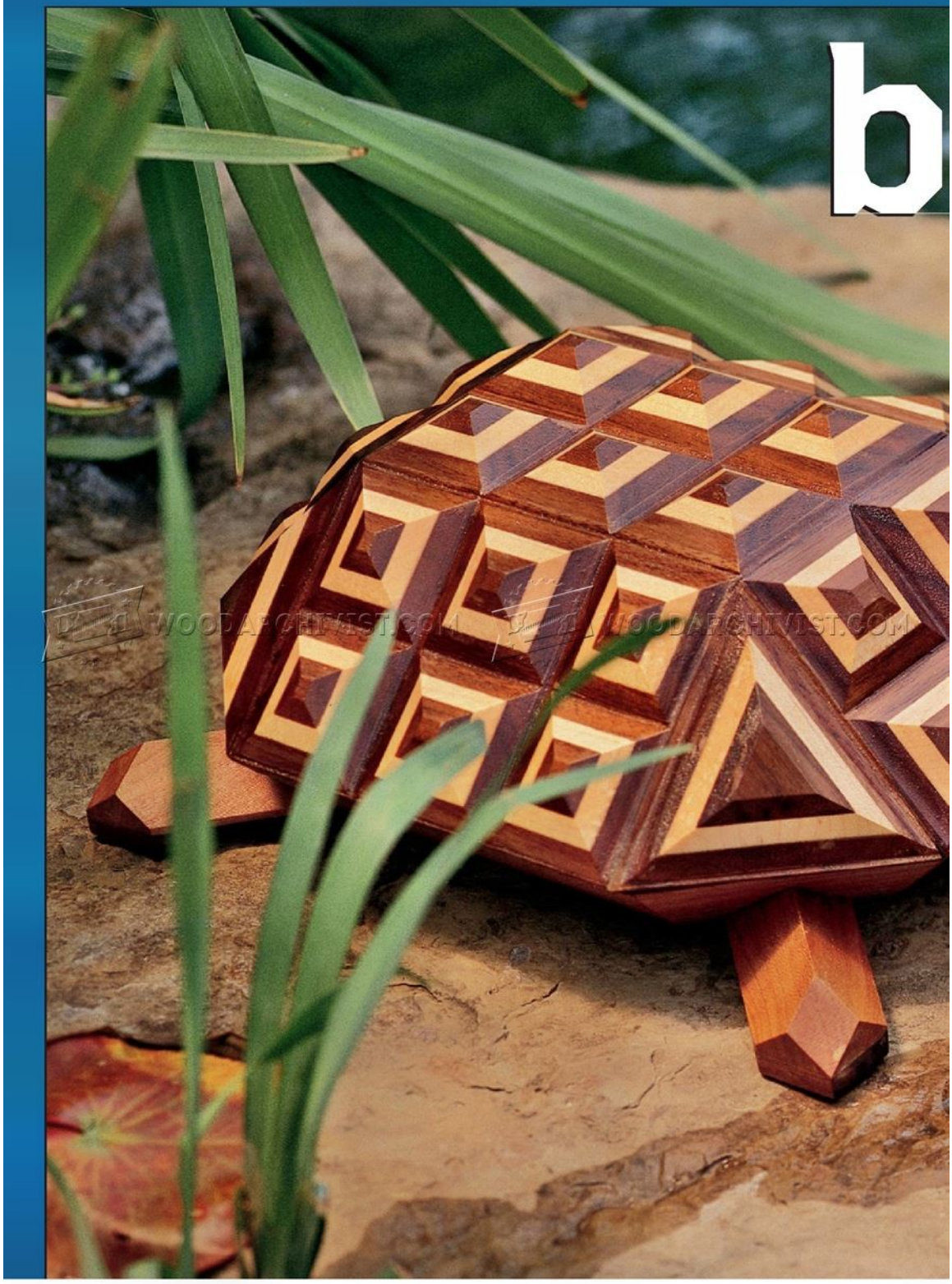

b

Photo by Al Parrish

ox turtle

People will wonder how you managed to build this multi-faceted shell.

Is it carved? Assembled from individual parts? As with many amazing things in woodworking, the answer is a router with just the right bit.

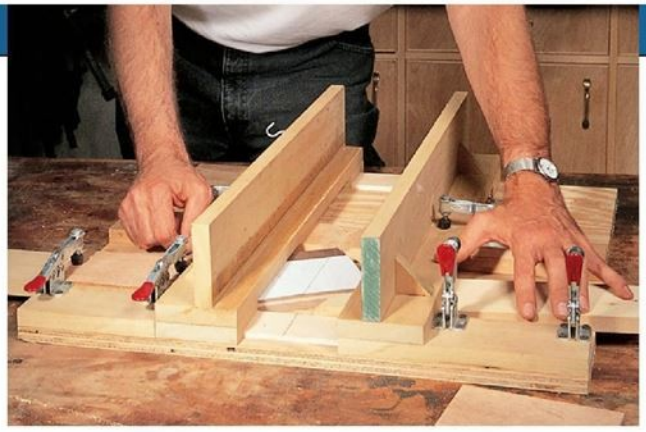
Almost every project requires a special tool – one that is occasionally pulled out of the back of a cabinet drawer or purchased specifically for the project. In the case of the Box Turtle, the reverse was true. A tool led to a project. I saw an unusual 120° v-grooving router bit in a catalog (Eagle America) and couldn't help but wonder what anyone would do with it. The Box Turtle is an answer.

Begin your box turtle by preparing laminated stock for the shell. You will need ⅜"- and ⅛"-thick material no less than 5½" wide. For the prototype appearing in this article, I stacked laminations starting with a base of ⅜" walnut, followed by ⅛" maple, topped with ⅛" walnut. This ⅝"-thick "zebra" plywood can be made of any contrasting woods. In order for the stock to be manageable in the router jig, refer to the cut sheets for layout of all the shell components on three 12" lengths. Since the width of some of the pieces is 5¼", it is important to keep the long edges of the laminations aligned during glue-up. To combat the inevitable sliding that occurs during clamping, I start with 13"-long strips, drill ¼" holes at the corners, and insert short lengths of ¼" registration dowels. My "press" consists of eight pistol-grip clamps, with two small bar clamps thrown in for good measure, and a 1x backer board.

To make the shell, first make your own plywood. I used alternating layers of walnut and maple, though any contrasting woods would do nicely (lacewood and maple perhaps?). As with veneering, you need to make sure you use enough glue and enough clamps. Apply the glue with a stiff-bristled brush and clamp it up with whatever you've got. Be sure to clamp the middle.

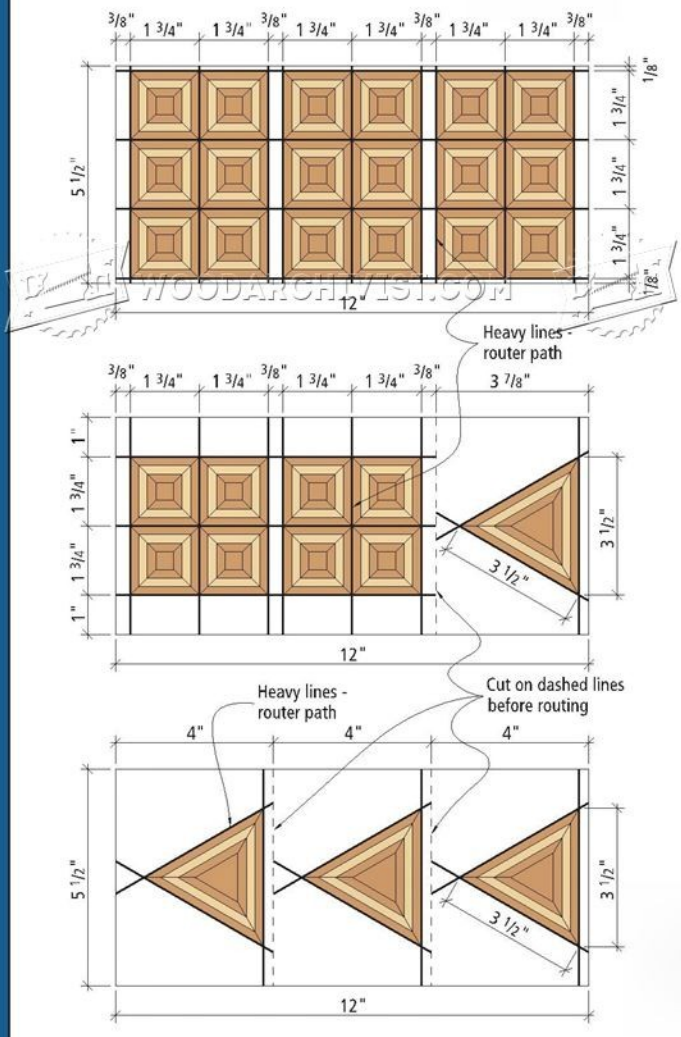
by John Hutchinson

The Box Turtle marks John's third appearance on the pages of Popular Woodworking. For those readers that have not attempted his Secret Toad Box or Sea-D Otter, we hope that this third project will be the charm. As we went to press, still more life forms were clawing their way up from the ooze of John's fertile mind. Stay tuned. You can contact John at JTHutch1@aol.com.



The surfacing jig (left) holds the parts in place during routing. To ensure they're at the correct angle, I cut blocks of plywood at the desired angle and wedged those against the work. Everything is then secured by toggle clamps. The router rides on a track above the jig (center). After two completed cuts, you can see how the triangular bits of the shell begin to take shape (right).

Cut Sheets

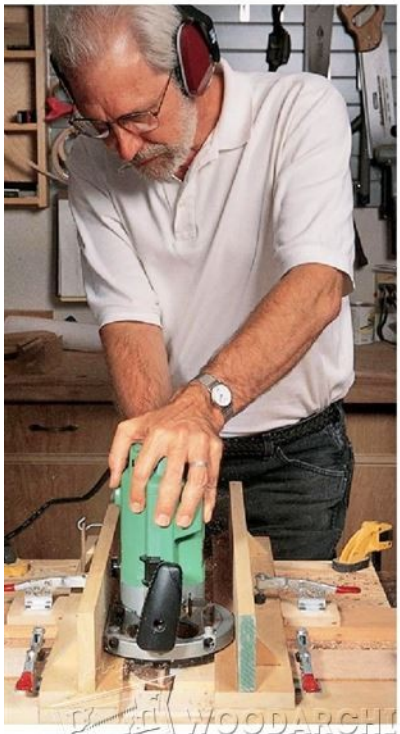


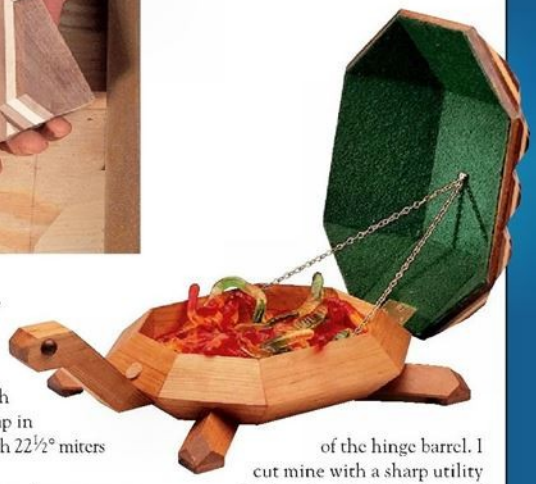
Cut the Shell

Next, separate the rectangular and triangular components following the instructions on the cut sheets. After securing these parts in a router surfacing/dado jig (shown above), form the pyramid mounds on the turtle shell by plowing v-grooves on the router path lines to a depth of ⅜". Due to the large diameter of the bit, make the cuts in multiple ⅛" descending passes with a router speed around 16,000 rpm.

With all routing operations complete, cut out the four- and six-square segments of the shell on a radial-arm saw with the assistance of a hold-down jig. The edge of the cut is the bottom of the v-groove. Cut all mating edges at 22½°, bevel in. Cut all bottom edges at 90°. Study the overall plan and exploded drawings of the turtle to determine mating and bottom edges. You may want to differentiate the two by running different colored pencil lines in the grooves before making the cuts. The triangular corners of the shell, although apparently more complex, are cut in the same manner as the square segments. Lay

Once you get the body segments cut, glue them to the base piece.





out an equilateral triangle on the plywood, 3½" per leg, and plow the 120° grooves on the router paths. Once again, cut the mating edges at 22½° and the bottom edges at 90°. Since there is no good way (that I know of) to clamp the segments during glue up, use a glue with a short open time such as Titebond II.

Build the Turtle Body

The lower container begins with a ½"-thick base. The sides require 1⅛" stock. Lay up two layers of 1x cherry and then plane the two-ply material down to the required thickness, taking equal amounts off each face. Ripping the material at 45° produces the 2¼" high wall stock. Glue this up in segments to the base with 22½° miters at the corners.

Make the head and neck components from the same 1⅛"-thick stock ripped to 1"-wide strips. Refer to the overall plan and section drawings for assembly. Add ⅜" walnut button plug eyes.

Cut the legs from ¾" cherry stock with multiple 45° rips and crosscuts per the pattern. Attach ¾"-square foot pads cut from ¼"-thick walnut.

Connecting the lid to base requires a common 1½" x 2" brass hinge, some careful mortising, and a little cheating. The mortises are radius-depth; that is, they are cut to a depth equal to half the diameter of the hinge barrel. I cut mine with a sharp utility knife and a chisel blade installed in my art knife. The hinge is easily secured to the base with the ½" screws that come with the hinge. Cheating comes into play when attaching the hinge to the lid. Since the screws are longer than the thickness of the lid, glue the plate in place with polyurethane glue. I have found that polyurethane tenaciously bonds anything to anything. I once, accidentally, glued a screwdriver to my workbench. Removing it took a divot of wood from the top. The lid screws are simply nipped heads glued in as hole fillers.

Once again, I used toggle clamps to secure the shell pieces when cutting them to size. Because of the pyramid shape of the shell, it was difficult to find a place for the clamp head to grab, so I put a piece of scrap plywood on top.

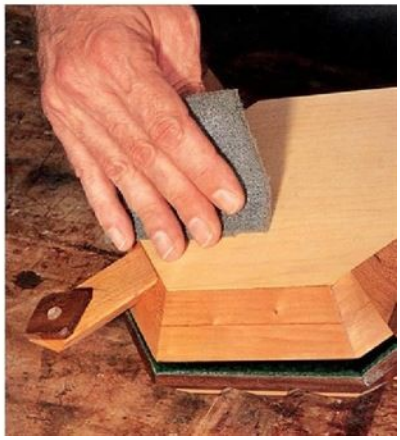
With your saw set to 22½°, make your cut. You can just as easily use a miter saw for this operation.

To glue up the shell segments, I made a "gluing form" of the shell. I used this form to hold the pieces at the correct angle as the glue set up.

Avoid the normal (and commendable) habit of sanding before finishing except on the razor edges on the base. The sharp angularity of the lid, head, neck, and legs, gives the turtle its faceted geometric character. Finish with your favorite wipe-on oil.

Line the underside of the lid with self-adhesive felt to prevent wear and tear on adjacent wood surfaces, silence the assembly, and add a touch of elegance to the interior.

Finally, attach the chain lid supports. I use light-gauge "hobby chain" available at any hardware store. Install the chain with brass wood screws to the sides of the box and the inside center of the shell. Experiment with the length until the chain neatly folds itself into the box as the lid is closed. As you drive the last screw into the



SUPPLIES

120° v-grooving bit: Eagle America, 888-872-7637, item #132-2805, $56.99

Toggle clamps: De-Sta-Co clamps, Reid Tool Supply, 800-253-0421, item #TC-215-U, $8.15 each

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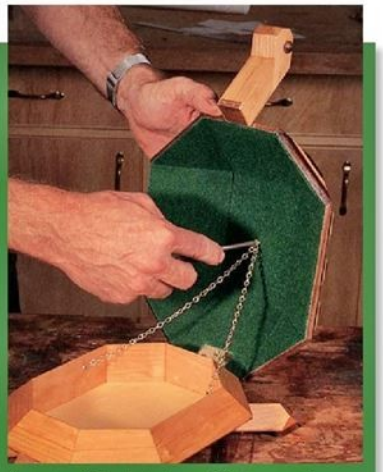
WE ALMOST PULLED IT OFF

More correctly, we did pull it off — the head, that is. In the photo at right, you'll notice that the head is tenuously attached to a walnut tab protruding from the shell. In John's original incarnation of the Box Turtle, the head was to serve as the handle for the lid. After the construction photos were taken, the lead "location" shot was made by our intrepid wildlife photographer, Al Parrish. While positioning the turtle to catch its best side, Al inadvertently snapped off the head. Rather than blaming Al for mishandling the beast, John admitted the design flaw and reworked the project as reflected by the text, drawings and all other photographs in the article. We thought we'd successfully pulled off the switch until we noticed the turtle still rearing its head in the chain attachment shot. Rather than cropping the head, we thought we'd give you an insight into some of the behind-the-scenes madness associated with the evolution of a project — especially when John is involved.

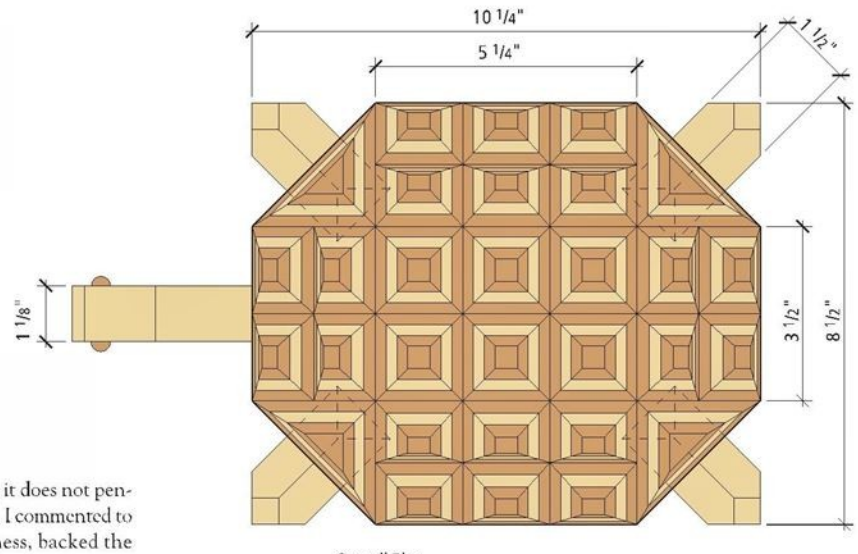


As you install the chain, be careful where you place the screw in the shell; parts of it are thin and your screw could appear on the outside of the shell.

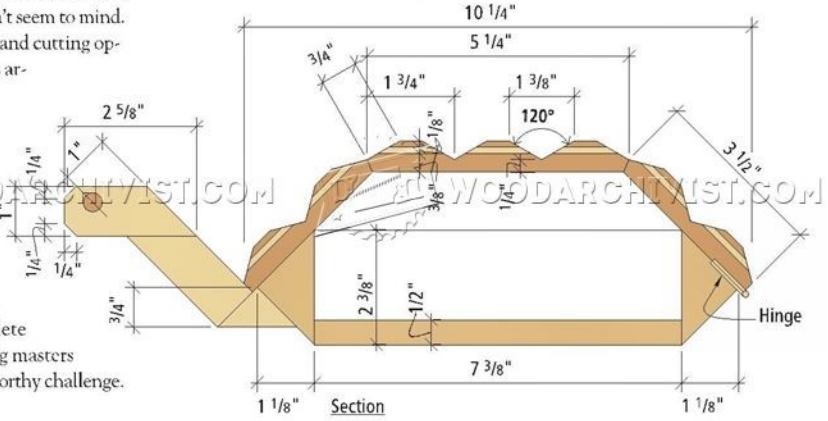
shell lid, be careful that it does not penetrate the top. Mine did. I commented to myself on my carelessness, backed the screw off, and pushed the wood fibers back into place. The turtle didn't seem to mind.

P.S. All of the routing and cutting operations described in this article can be accomplished on a table saw with the assistance of jigs. Since the angled surfaces of the plowed valleys are ¾", a 13/16" stack dado, set at 30°, will form one side of the valley. Reversing the direction of cut will complete the valley. I'm sure the jig masters out there will find this a worthy challenge.

PW

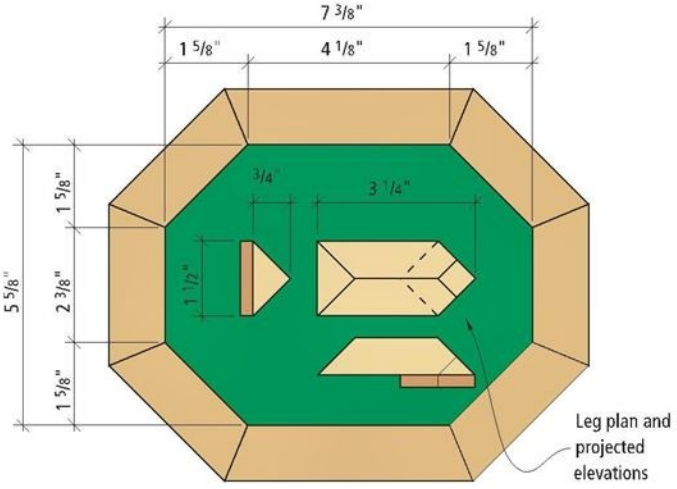


Overall Plan



Section

A little sanding between coats produces a nice finish. Also, note how the feet are attached to the underside of the base.



Box Plan

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